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MPEG-7 Multimedia Description Schemes

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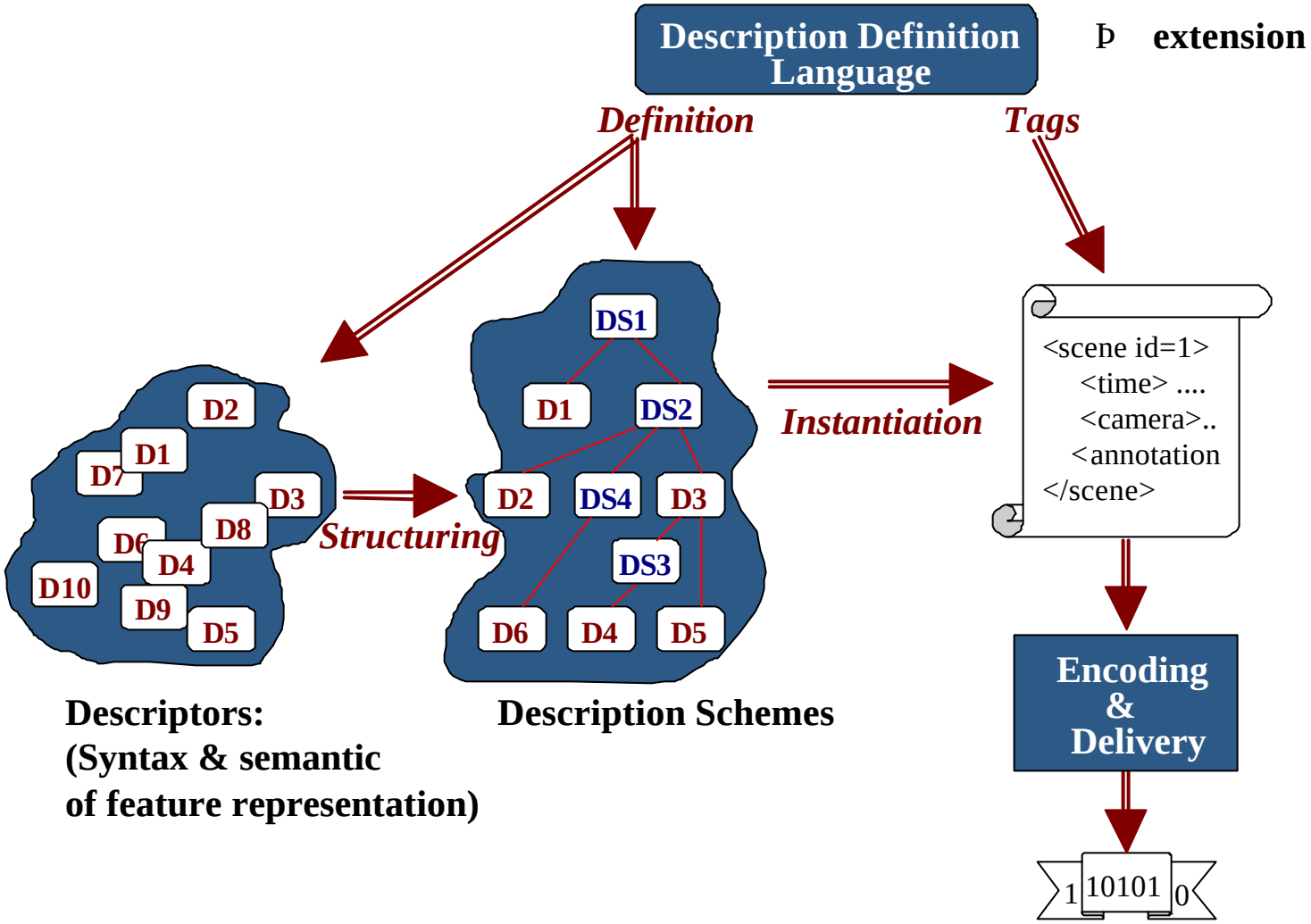
Parts of the MPEG-7 Standard

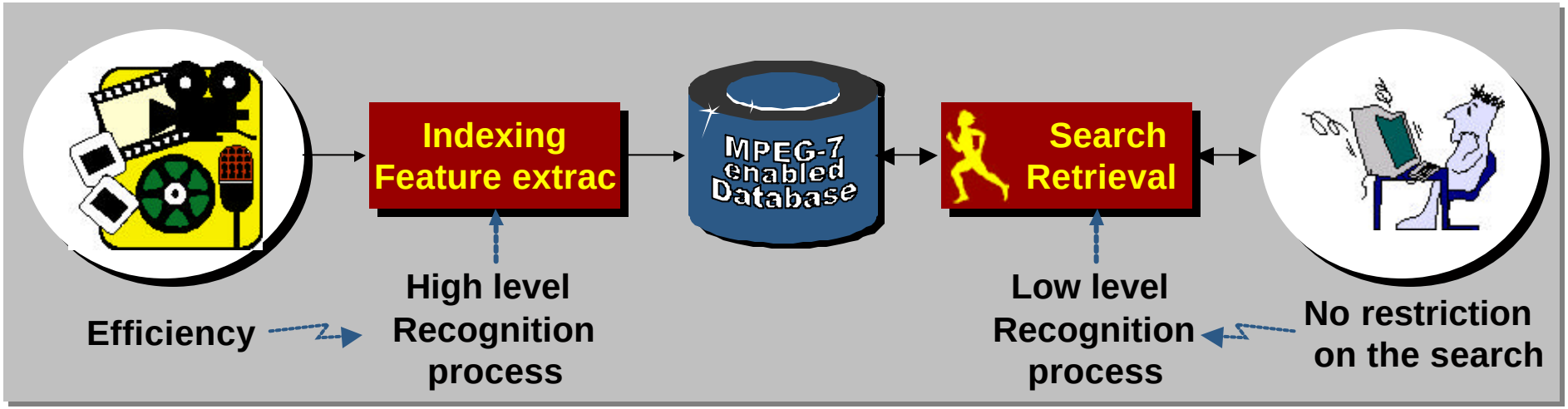
- ISO / IEC 15938 - 1: Systems
- ISO / IEC 15938 - 2: Description Definition Language
- ISO / IEC 15938 - 3: Visual
- ISO / IEC 15938 - 4: Audio
- ISO / IEC 15938 - 5: Multimedia Description Schemes
- ISO / IEC 15938 - 6: Reference Software
- ISO / IEC 15938 - 7: Conformance

MPEG-7 working areas



Type of description

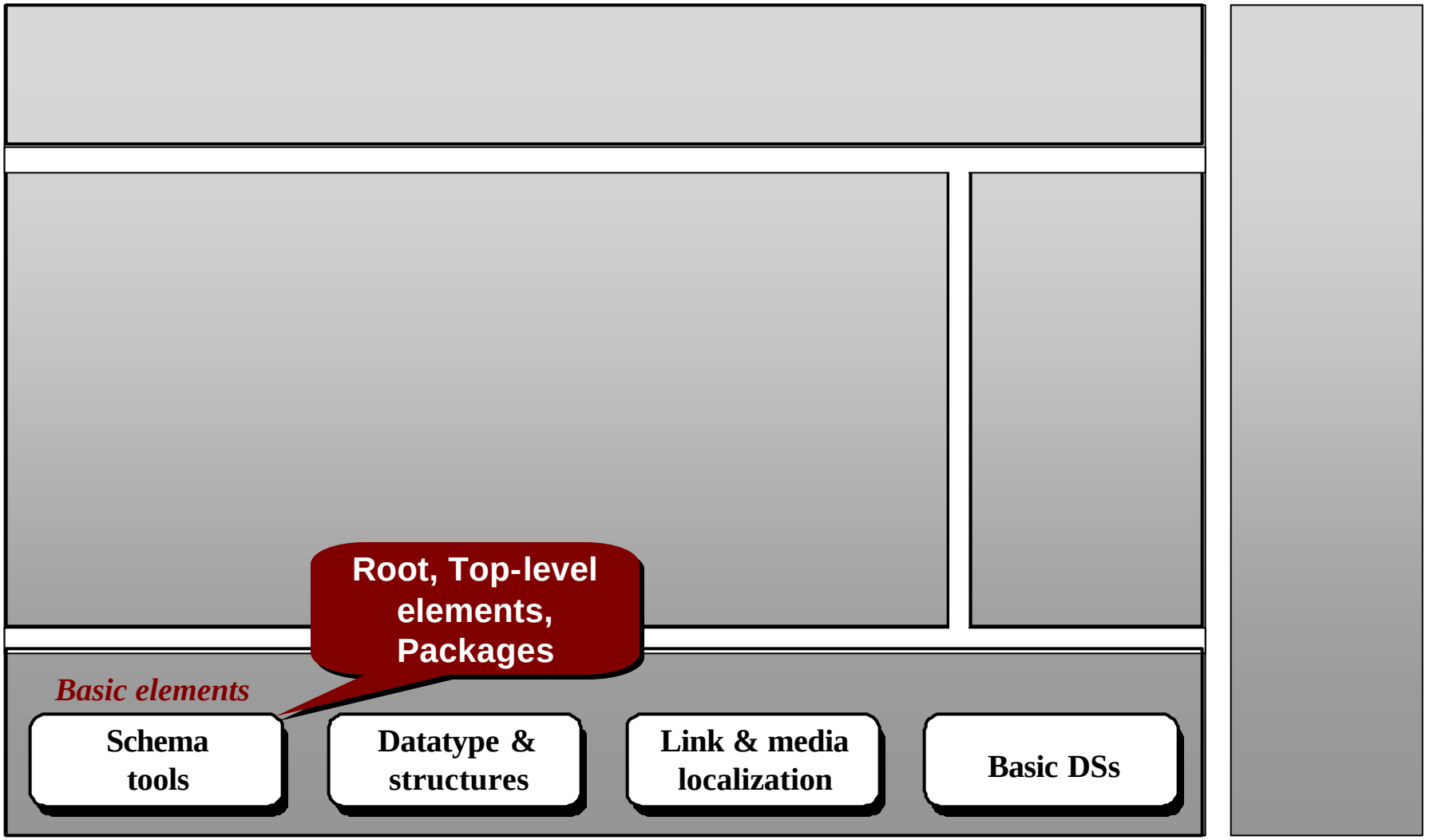
- Information about the content: recording date & conditions, title, author, copyright, coding format, classification, etc.
- Information present in the content: Combination of low level and high level descriptors
  - High level description:
    - Efficient and powerful
    - Lack of flexibility
  - Low level description
    - Generic and flexible
    - Intelligent / efficient search engine



Outline

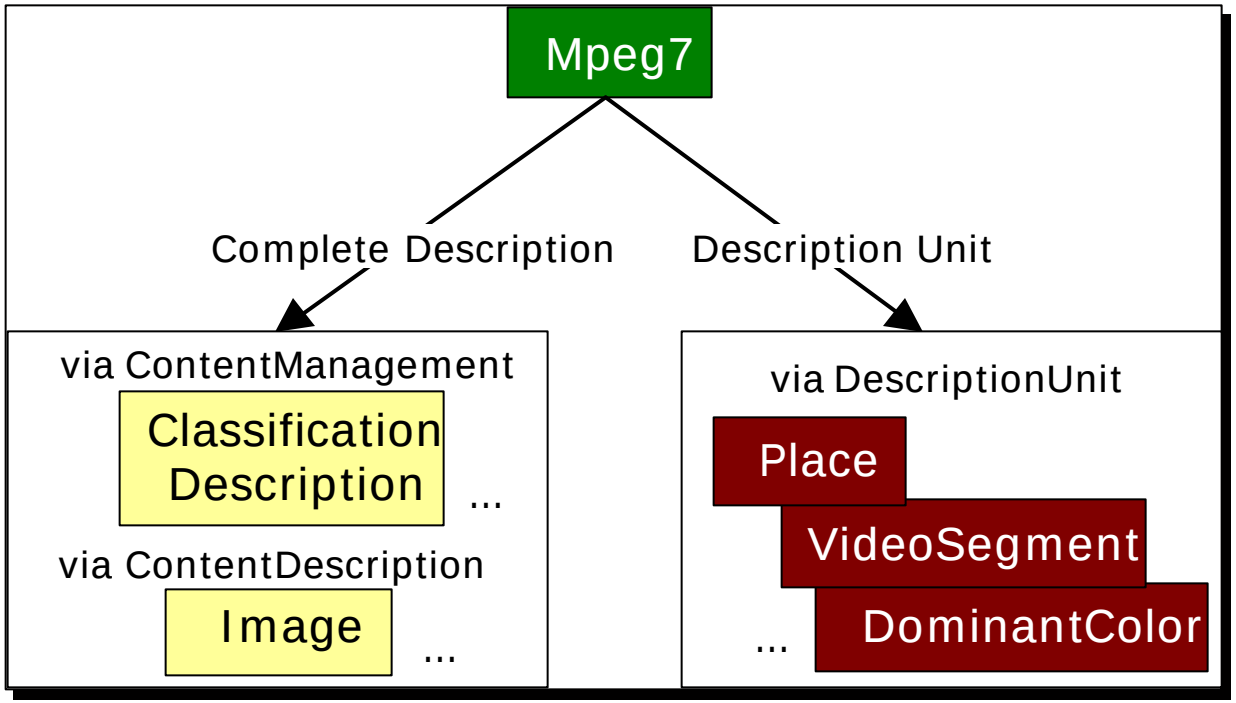
- Basic elements
- Content management and description
- Navigation and Access
- Content organization
- User interaction

Basic elements



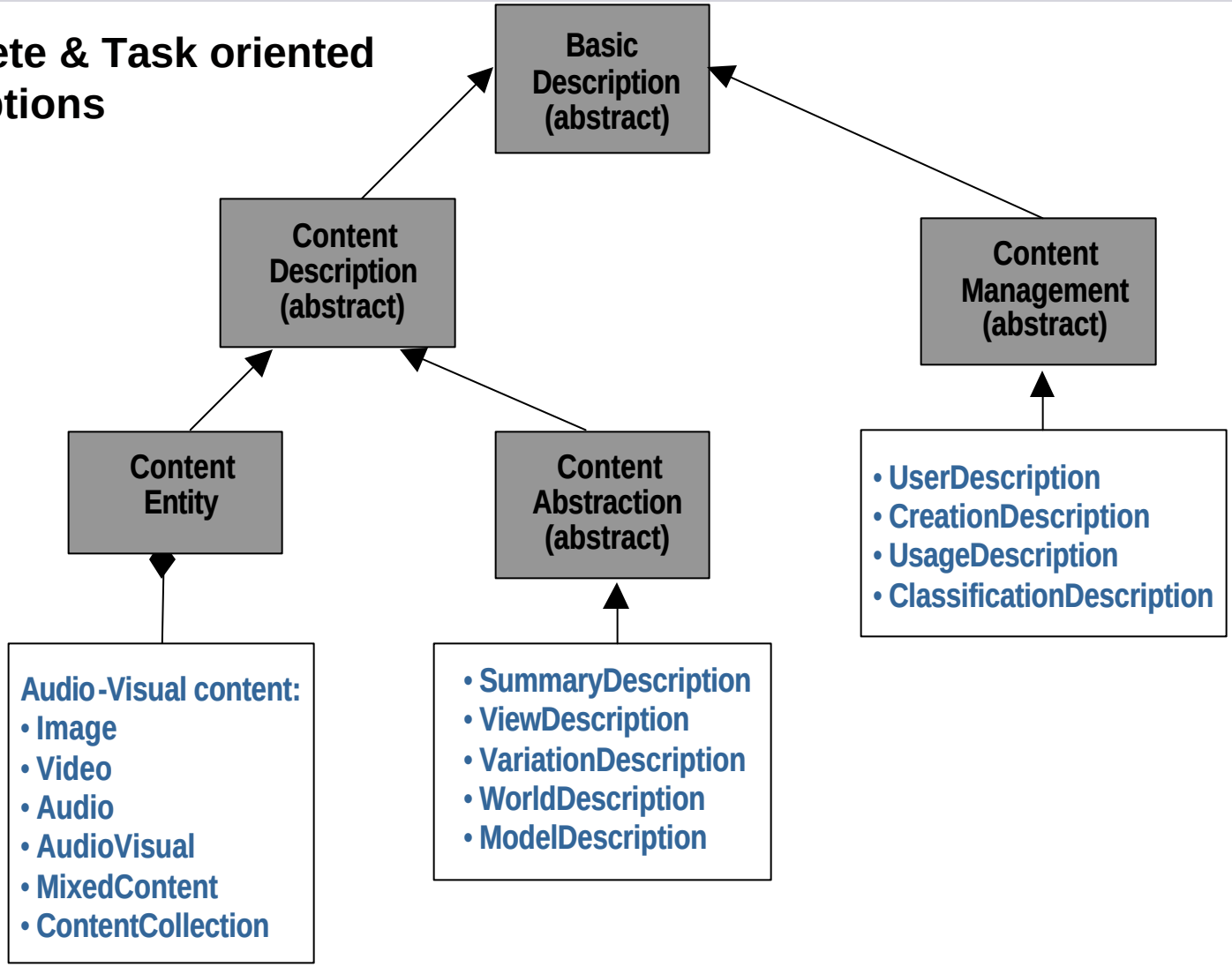
Schema tools: Root element

- Wrapper of the description
- Two types of description:
  - Complete description: complete in the sense of an application
  - Description unit: partial or incremental information

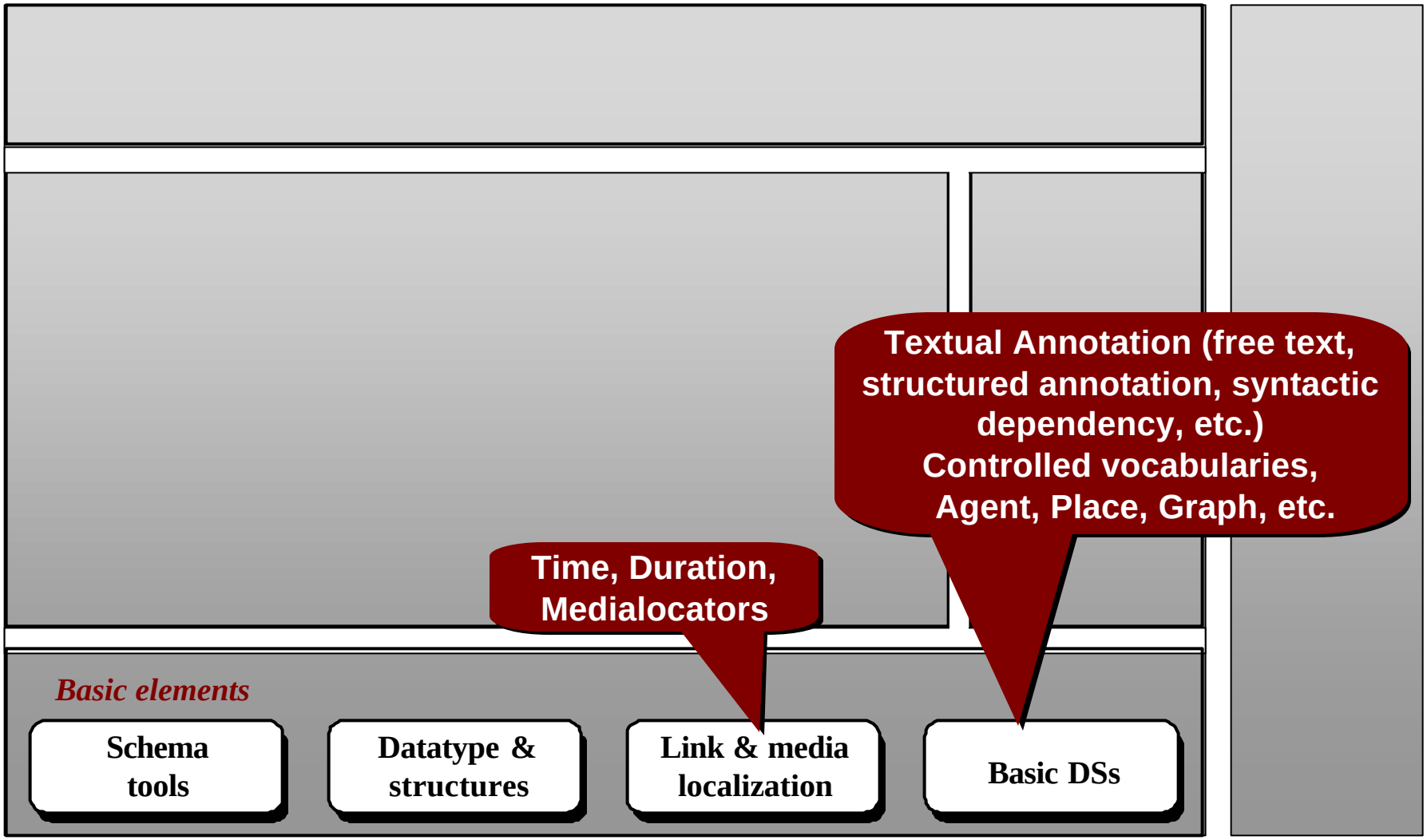


Schema tools: Top-level elements

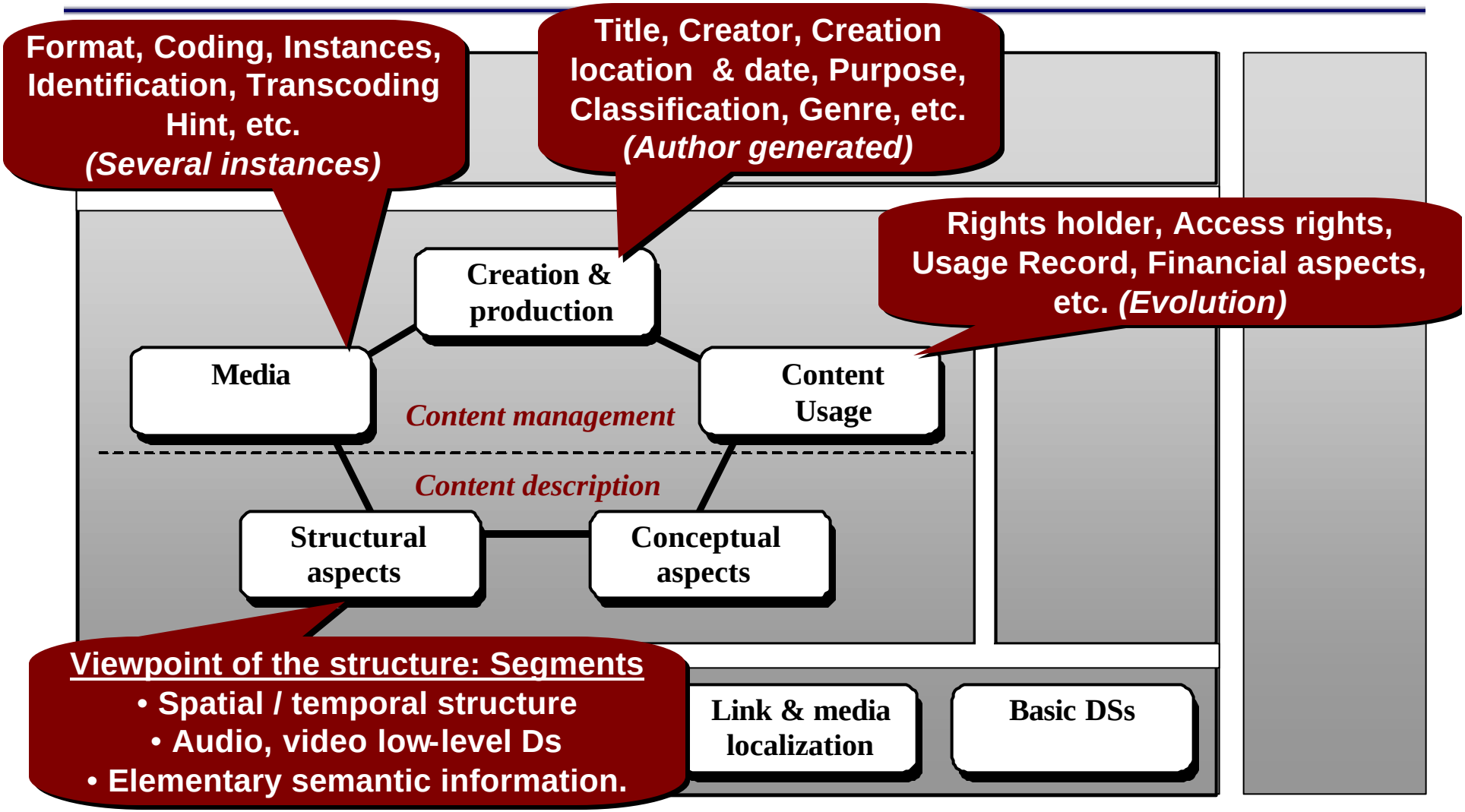
- **Complete & Task oriented descriptions**



Basic elements



Content Management & Description



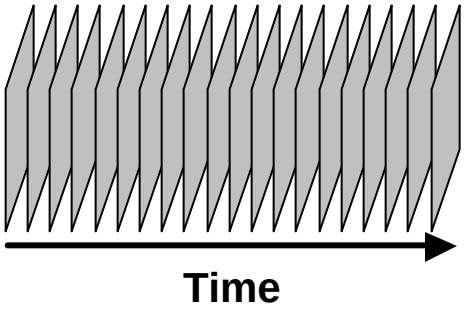
Segment DS

Common properties of:

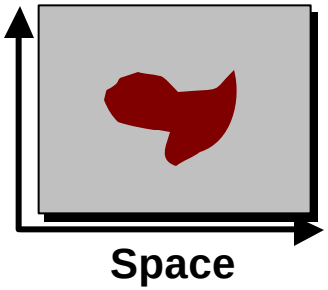
AudioVisual segments

Time

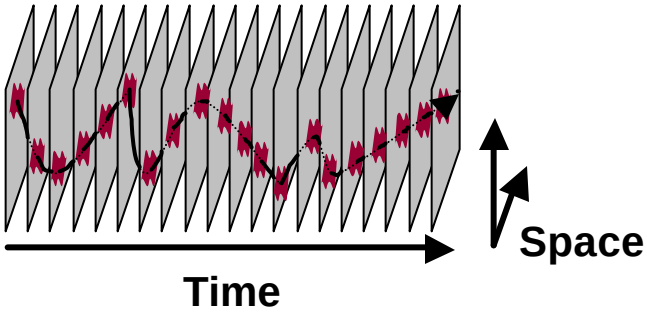
Video segments



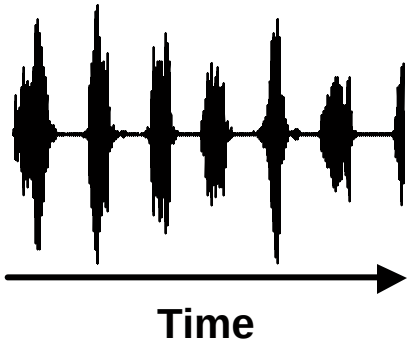
Still regions (Mosaic)



Moving regions (VideoText, InkSegment)



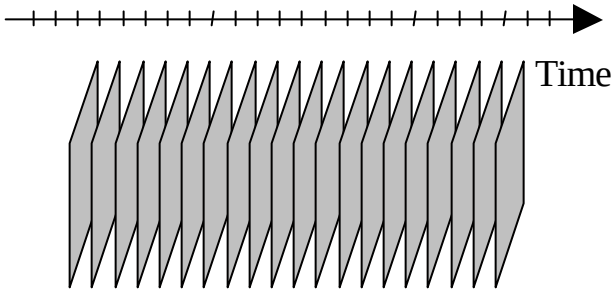
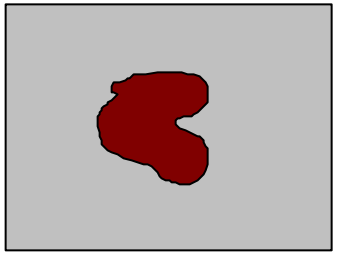
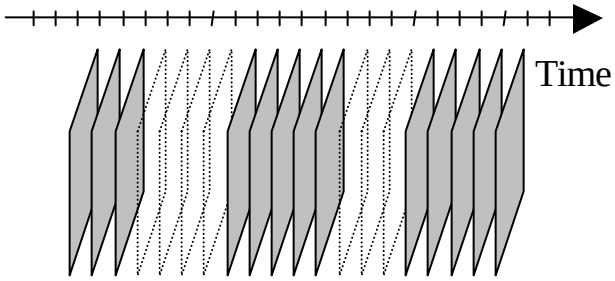
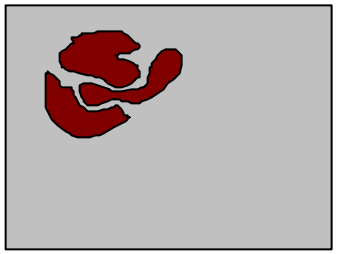
Audio segments



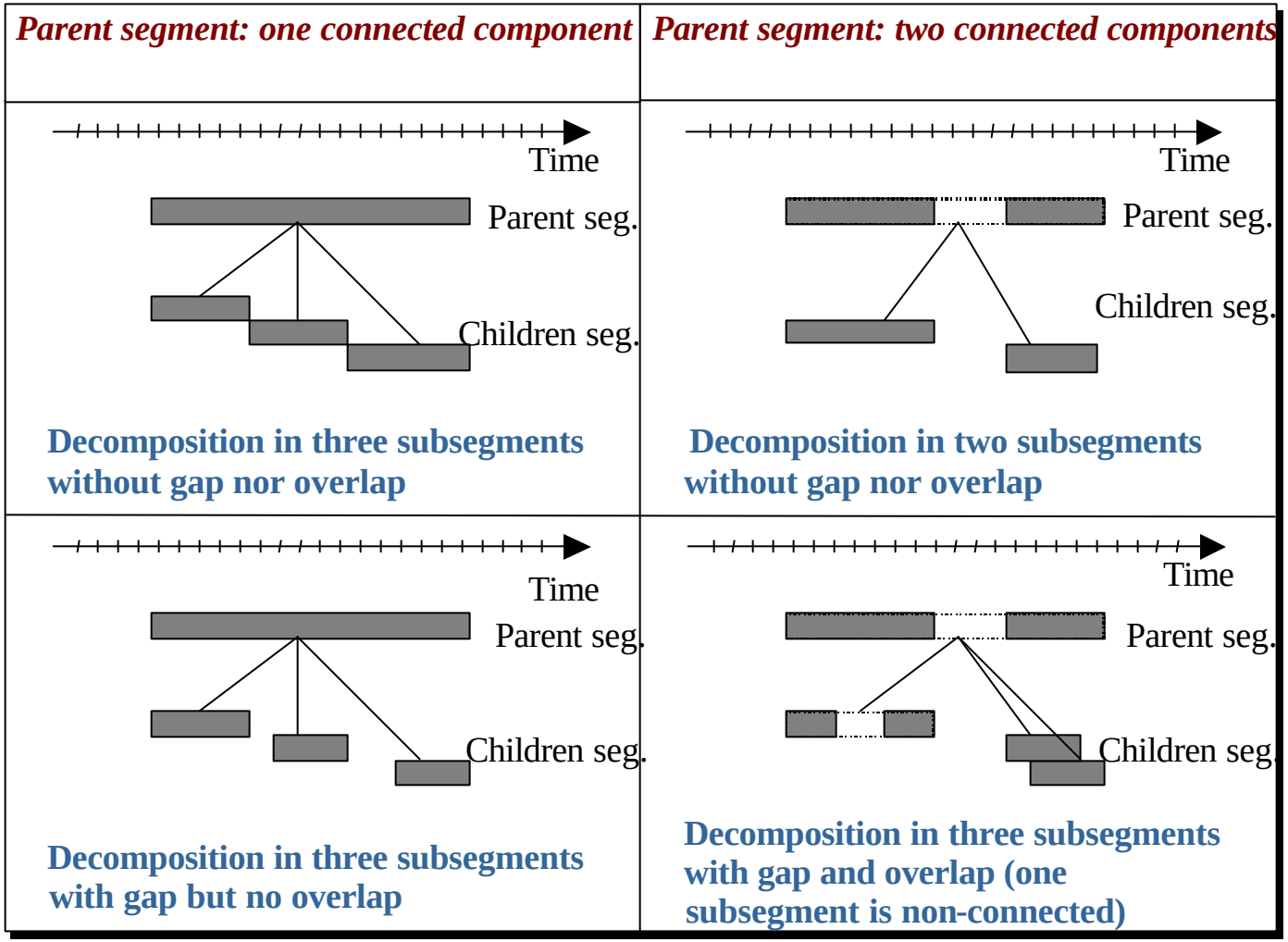
Common segment properties

- Identification
- Creation Information
- Usage Information
- Media Information
- Annotation
- Segment Decomposition

Segment connectivity

Temporal segment *(AudioVisual, Video, Audio Segments)*	***Spatial segment*** *(StillRegion)*
 one connected component	 one connected component
 three connected components	 three connected components

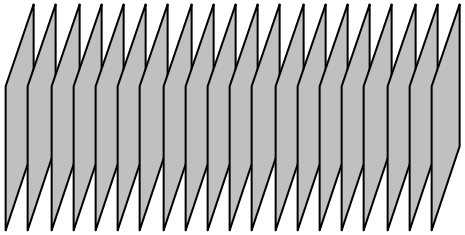
Segment decomposition



Specific description of segments

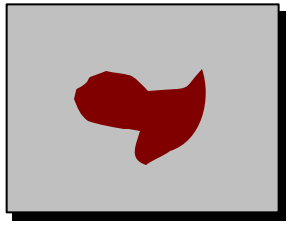
(See audio and Visual parts)

Video segments



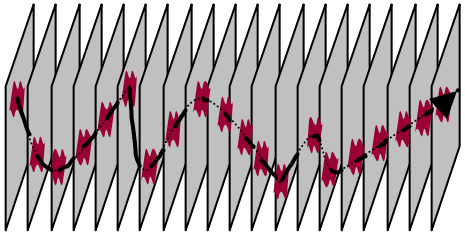
- Color
- Camera motion
- Motion activity
- Mosaic

Still regions



- Color
- Shape
- Position
- Texture

Moving regions

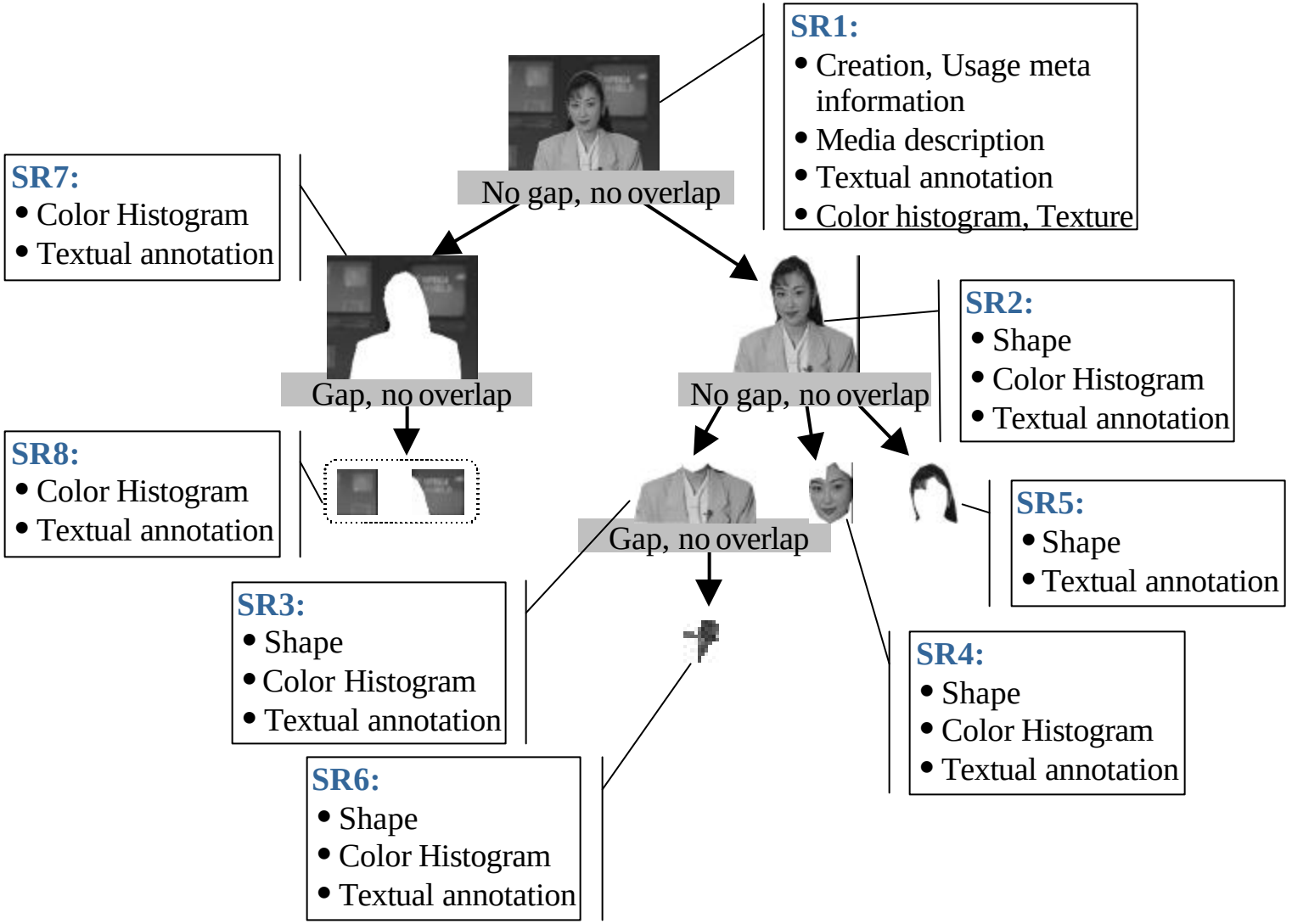


- Color
- Motion trajectory
- Parametric motion
- Spatio-temporal shape

Audio segments

- Spoken content
- Spectral characterization
- Music: timbre, melody

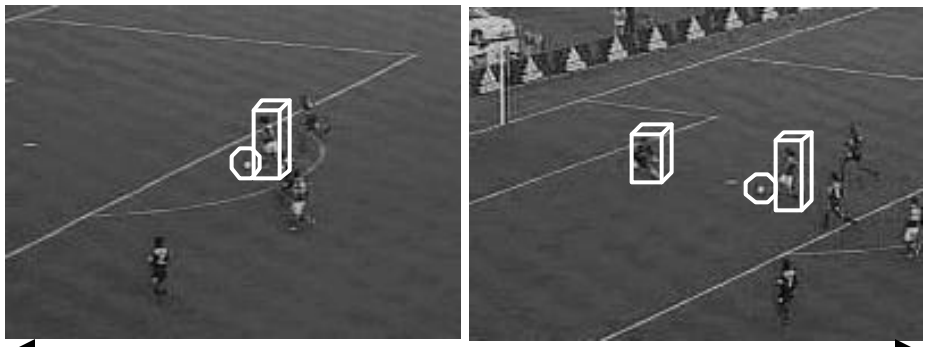
Example of Segment trees



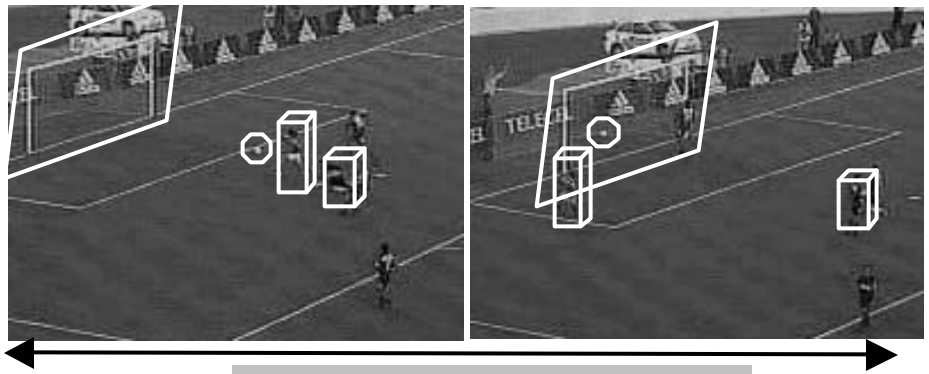
Graph

- Goal:
  - The segment DS allows the construction of tree structures
    - Efficient for access, retrieval, compression.
    - Lack of flexibility
  - Graph structure to improve flexibility

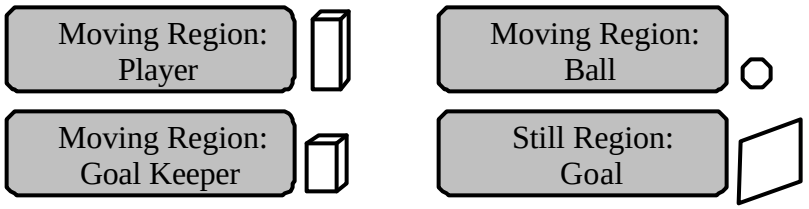
- Outline of the approach:
  - Definition of entity nodes representing segments
  - Definition of relationships: space, time, visual

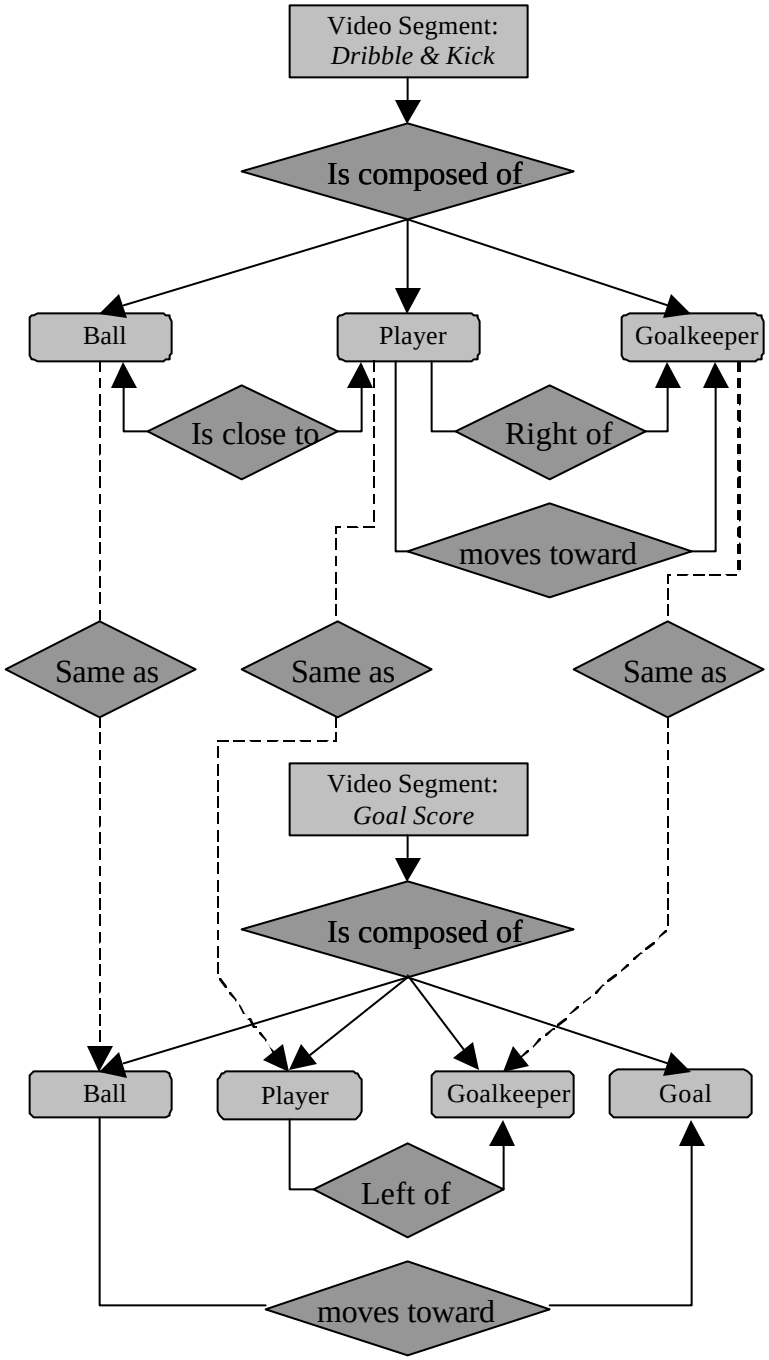


Video Segment 1: *Dribble & Kick*

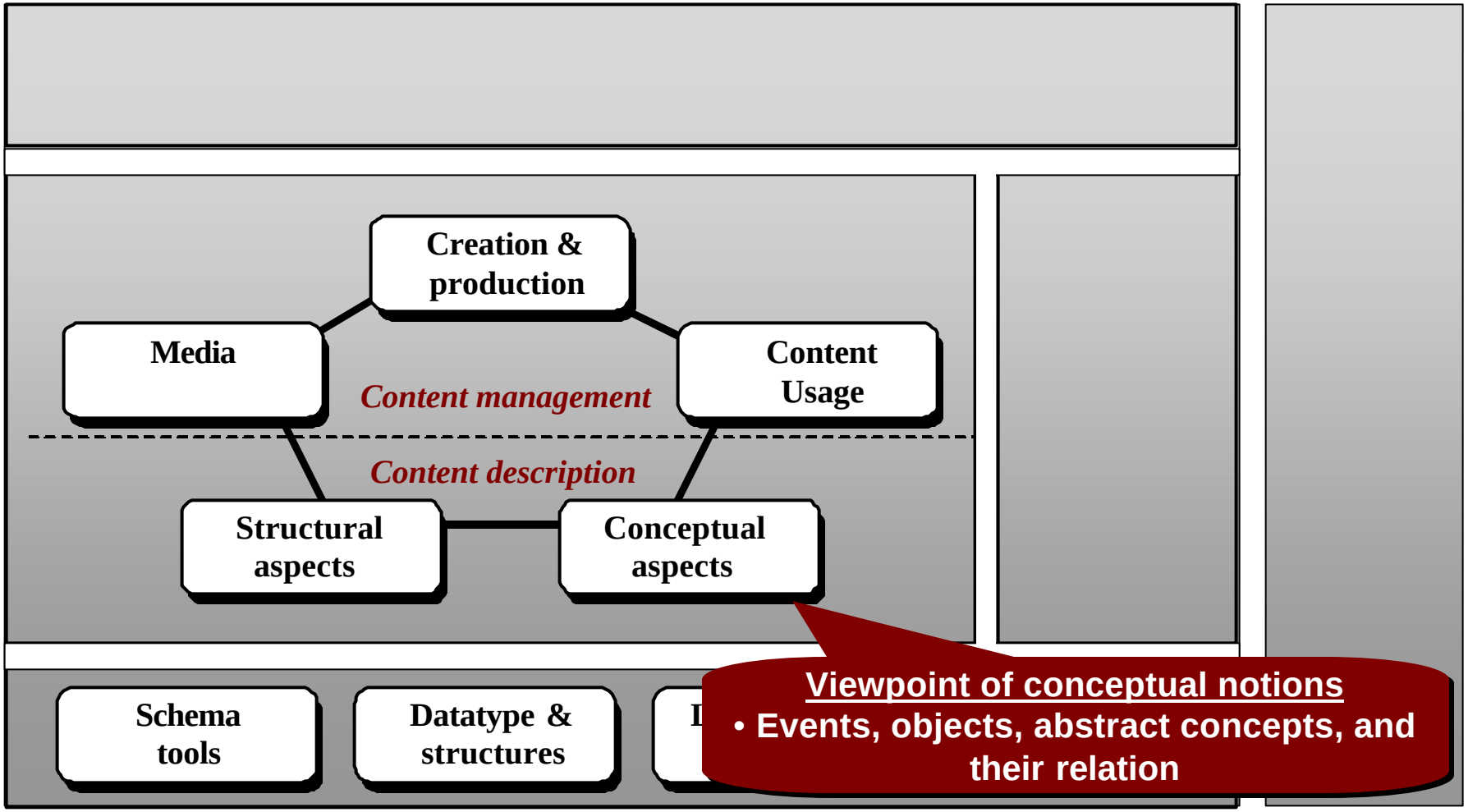


Video Segment 2: *Goal Score*

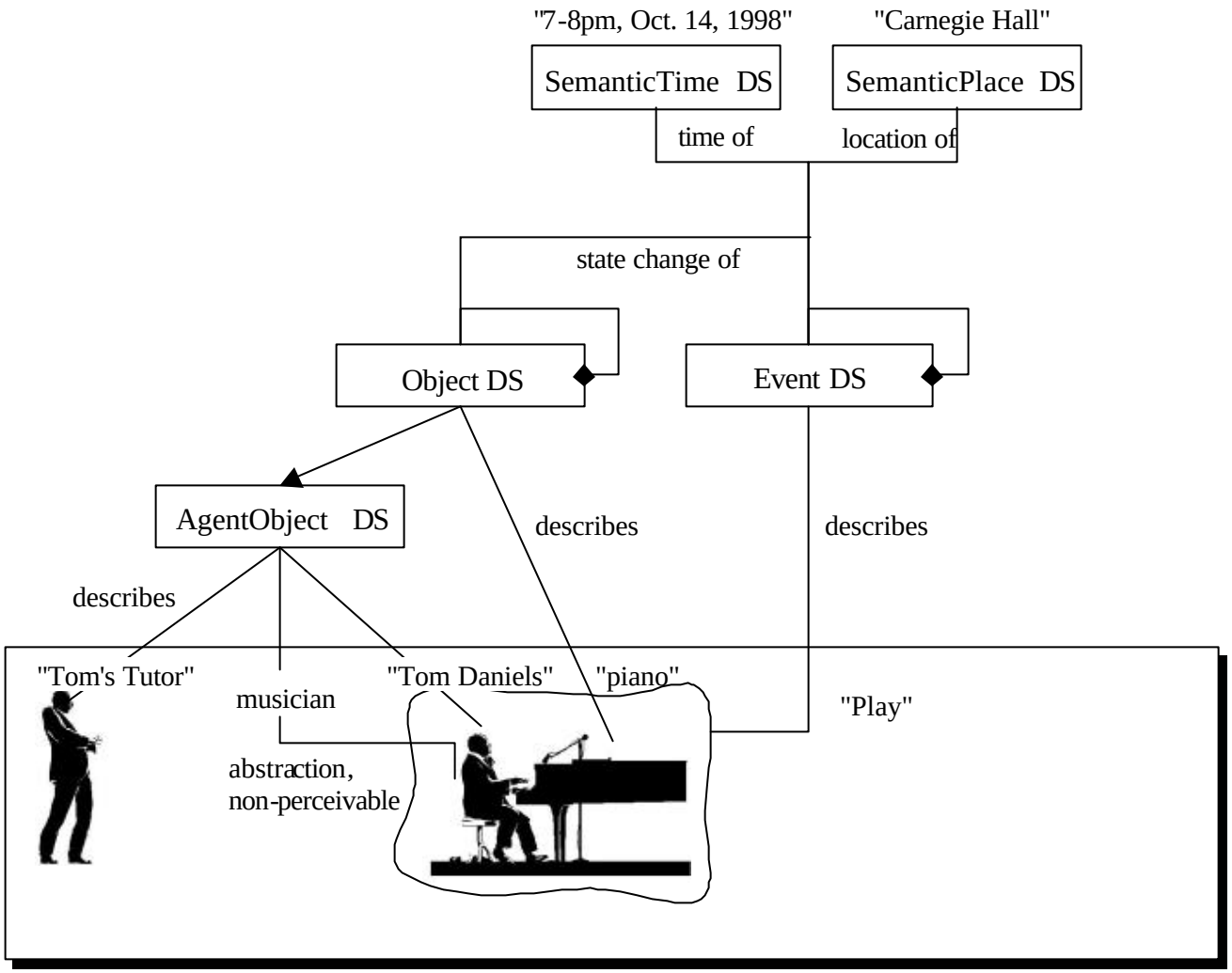




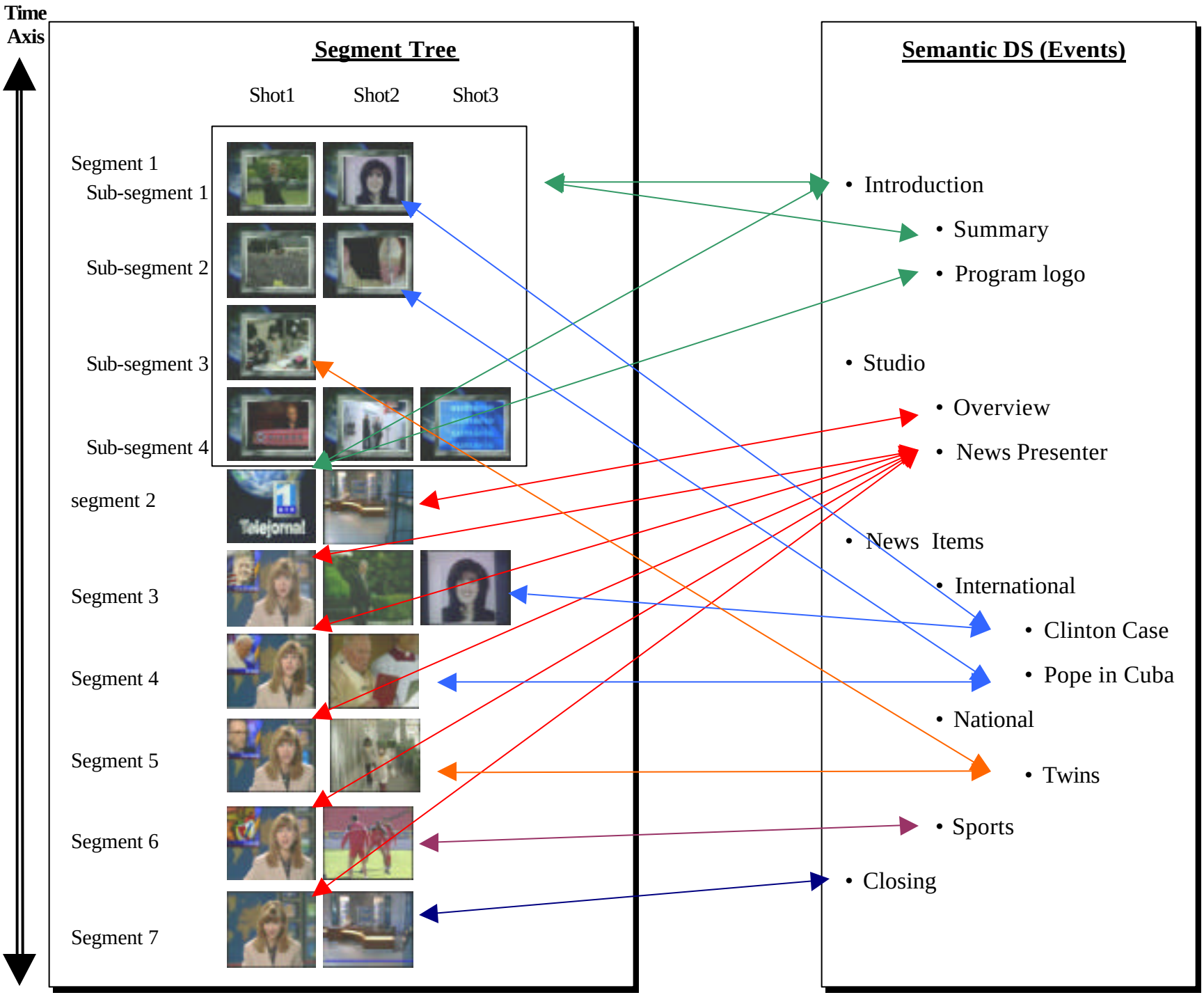
Content Management & Description (Conceptual aspects)



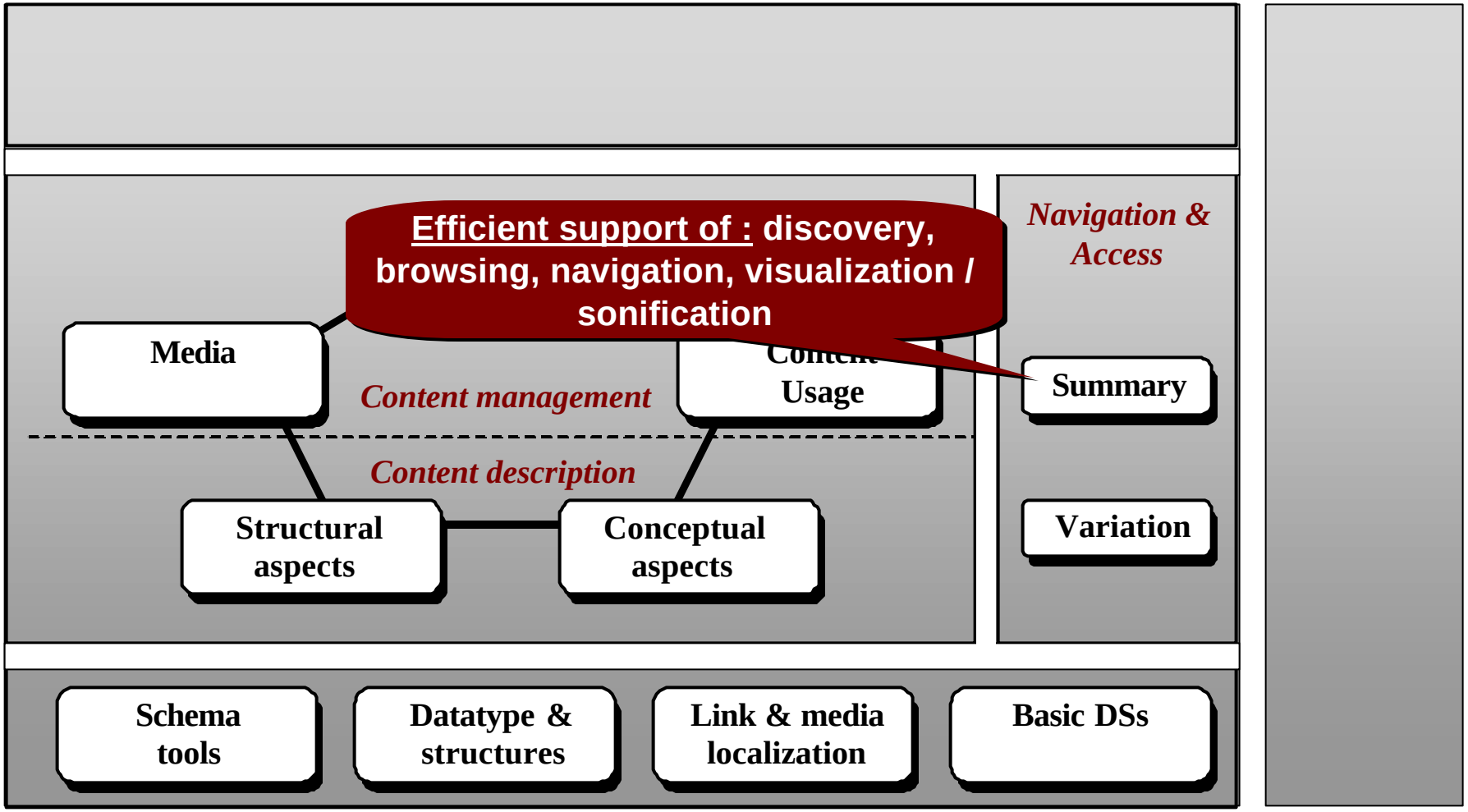
Conceptual aspects



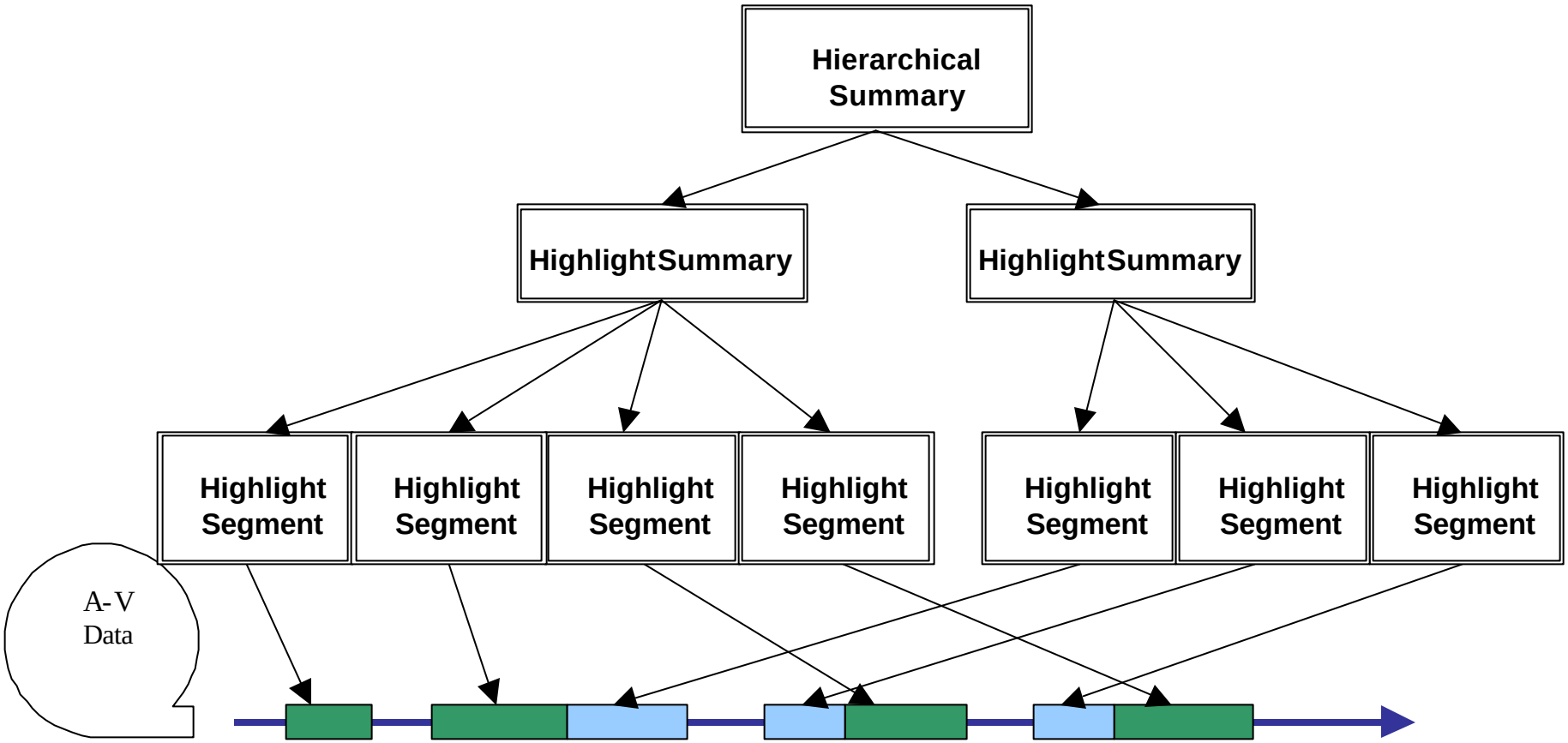
Narrative World


Time Axis
Segment Tree
Shot1
Shot2
Shot3
Segment 1
Sub-segment 1
Sub-segment 2
Sub-segment 3
Sub-segment 4
segment 2
Segment 3
Segment 4
Segment 5
Segment 6
Segment 7
Semantic DS (Events)
• Introduction
• Summary
• Program logo
• Studio
• Overview
• News Presenter
• News Items
• International
• Clinton Case
• Pope in Cuba
• National
• Twins
• Sports
• Closing

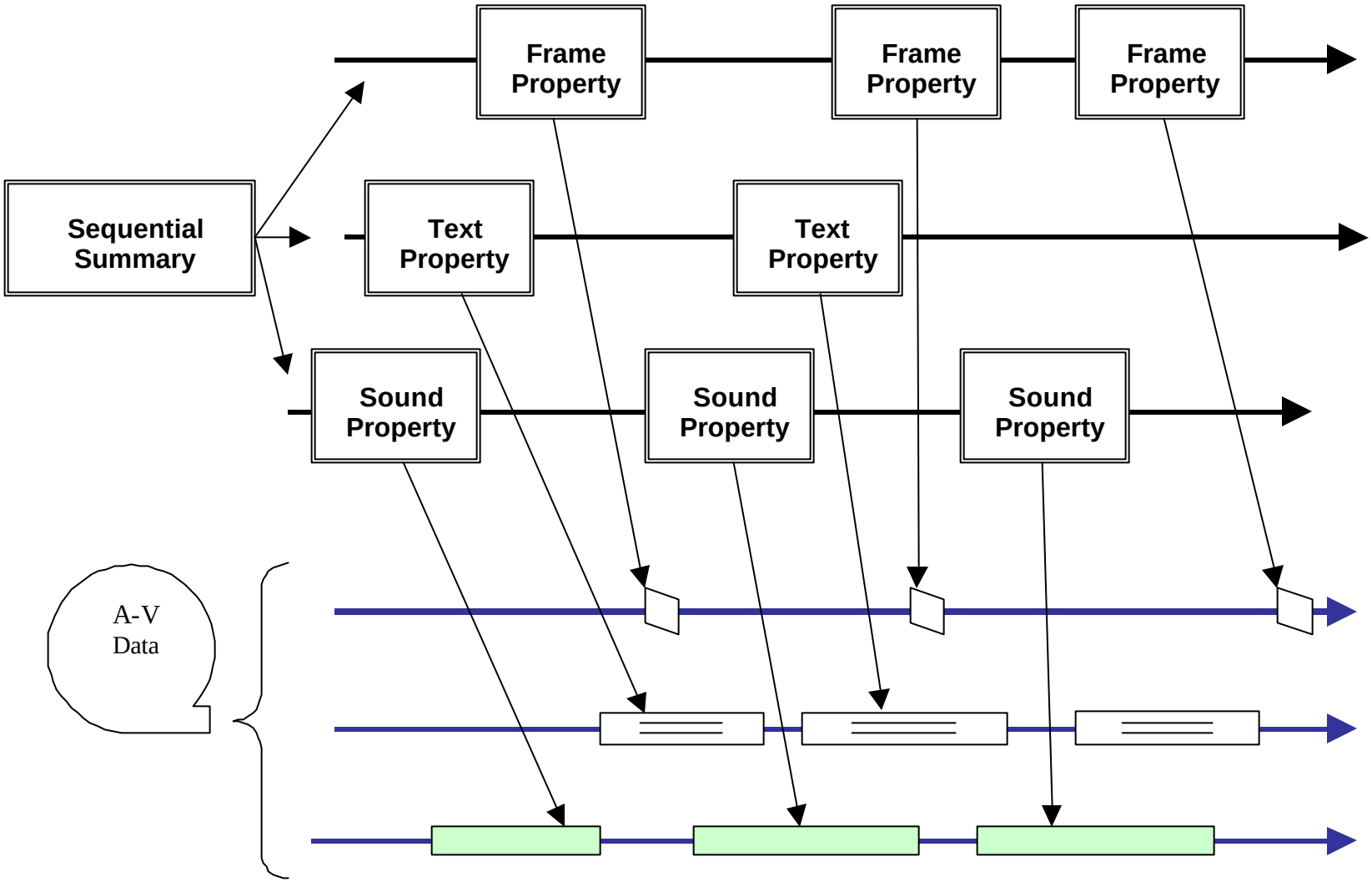
Navigation and Access



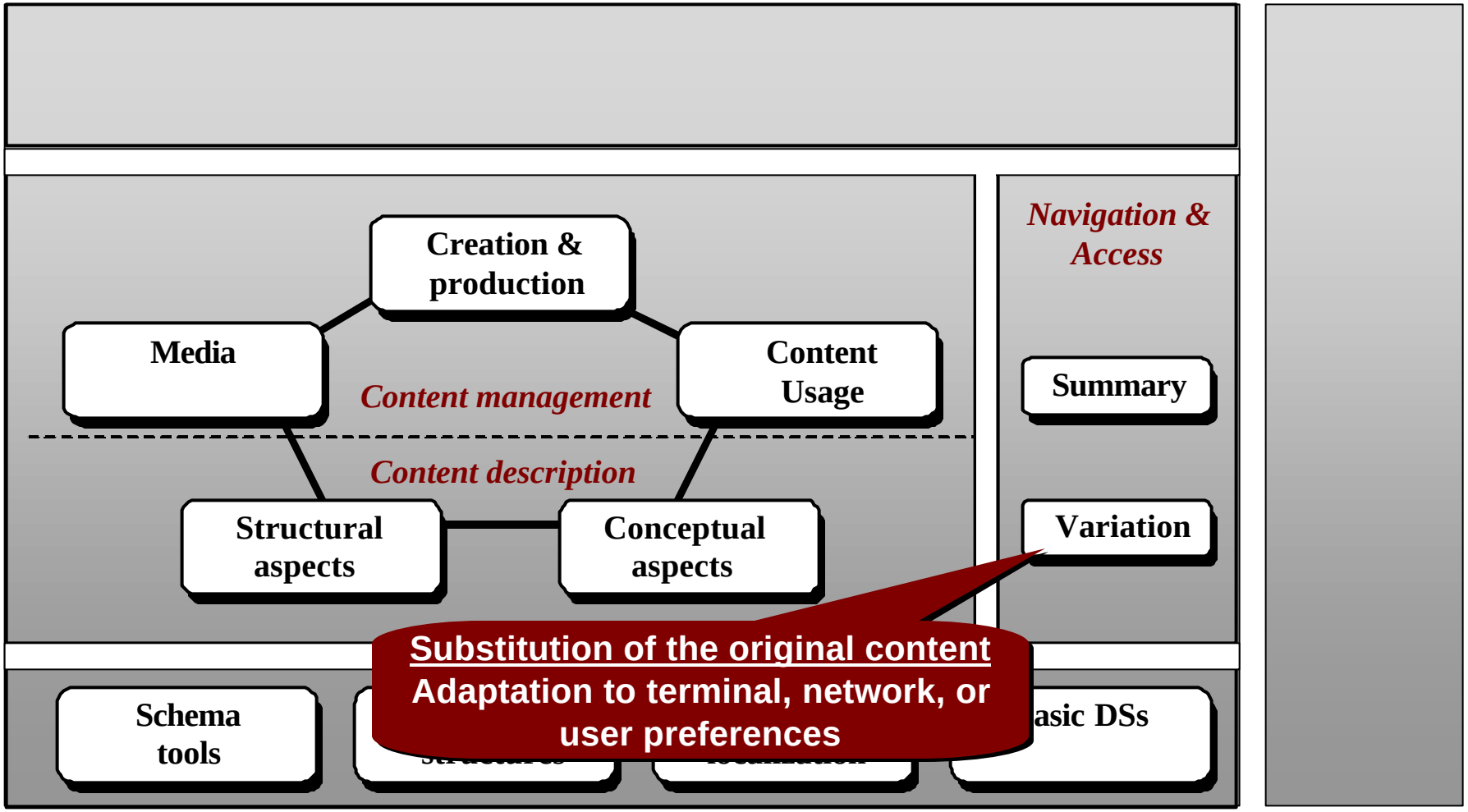
Hierarchical summary



Sequential summary

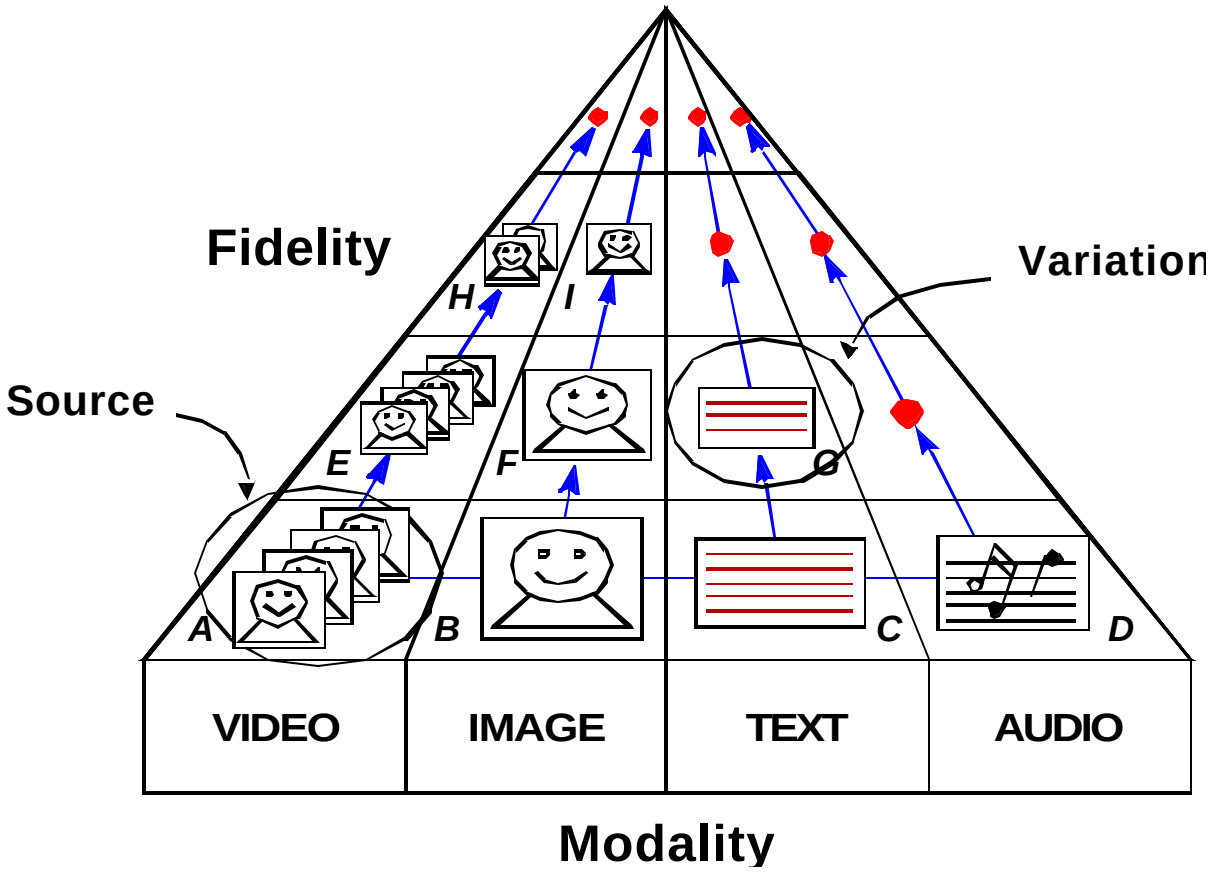


Navigation and Access

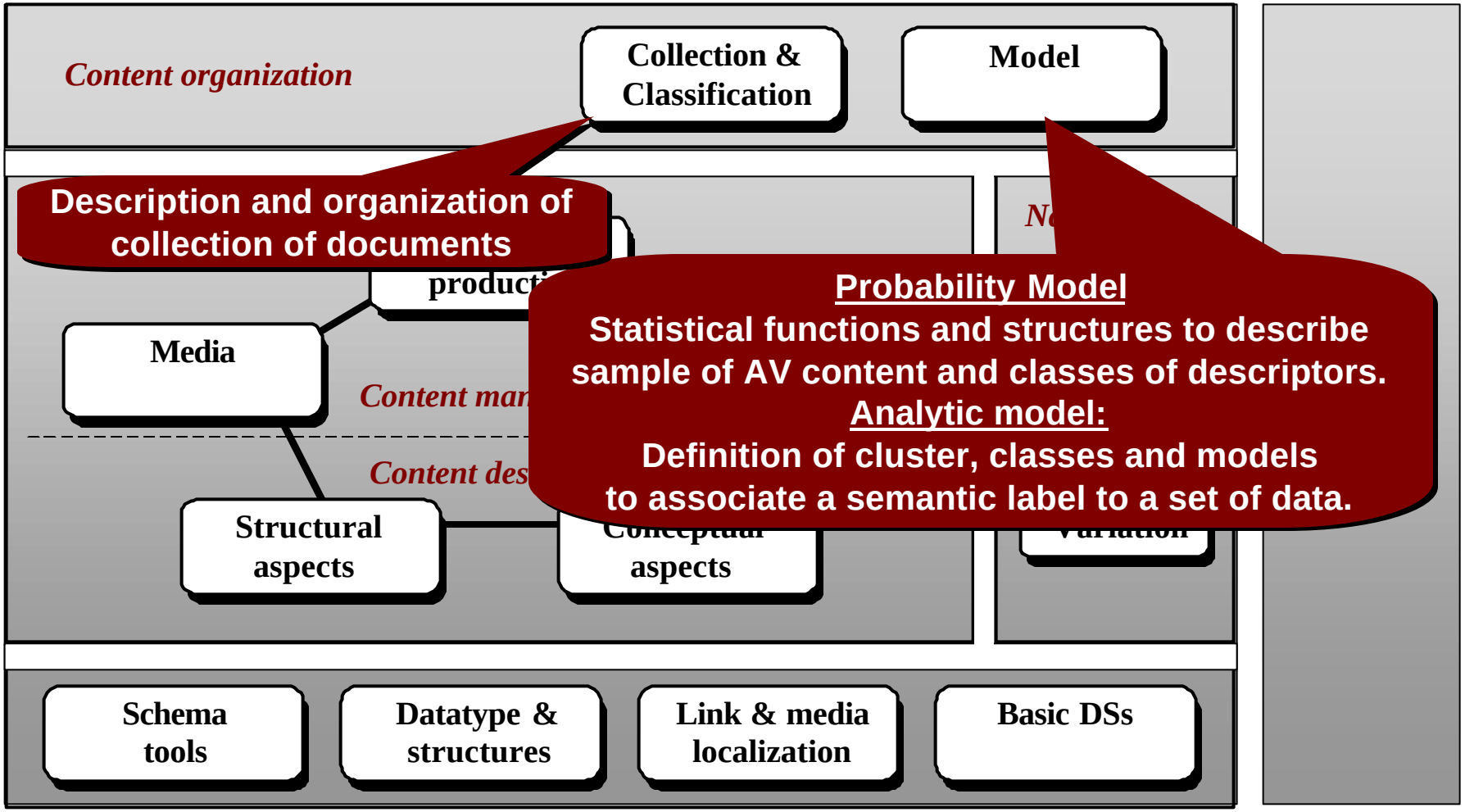


Variation

Universal Multimedia Access: Adapt delivery to network and terminal characteristics (QoS)



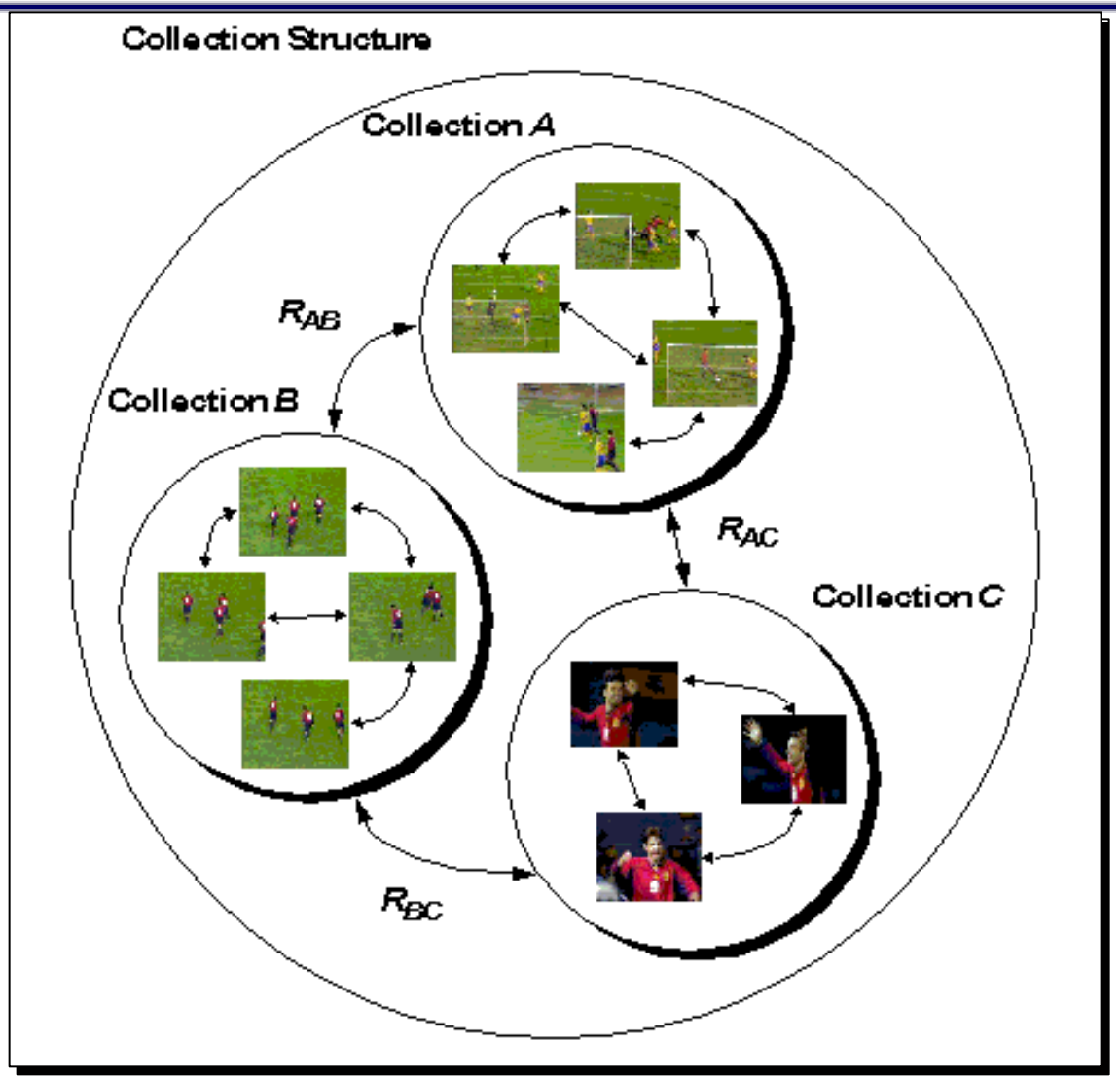
Content Organization



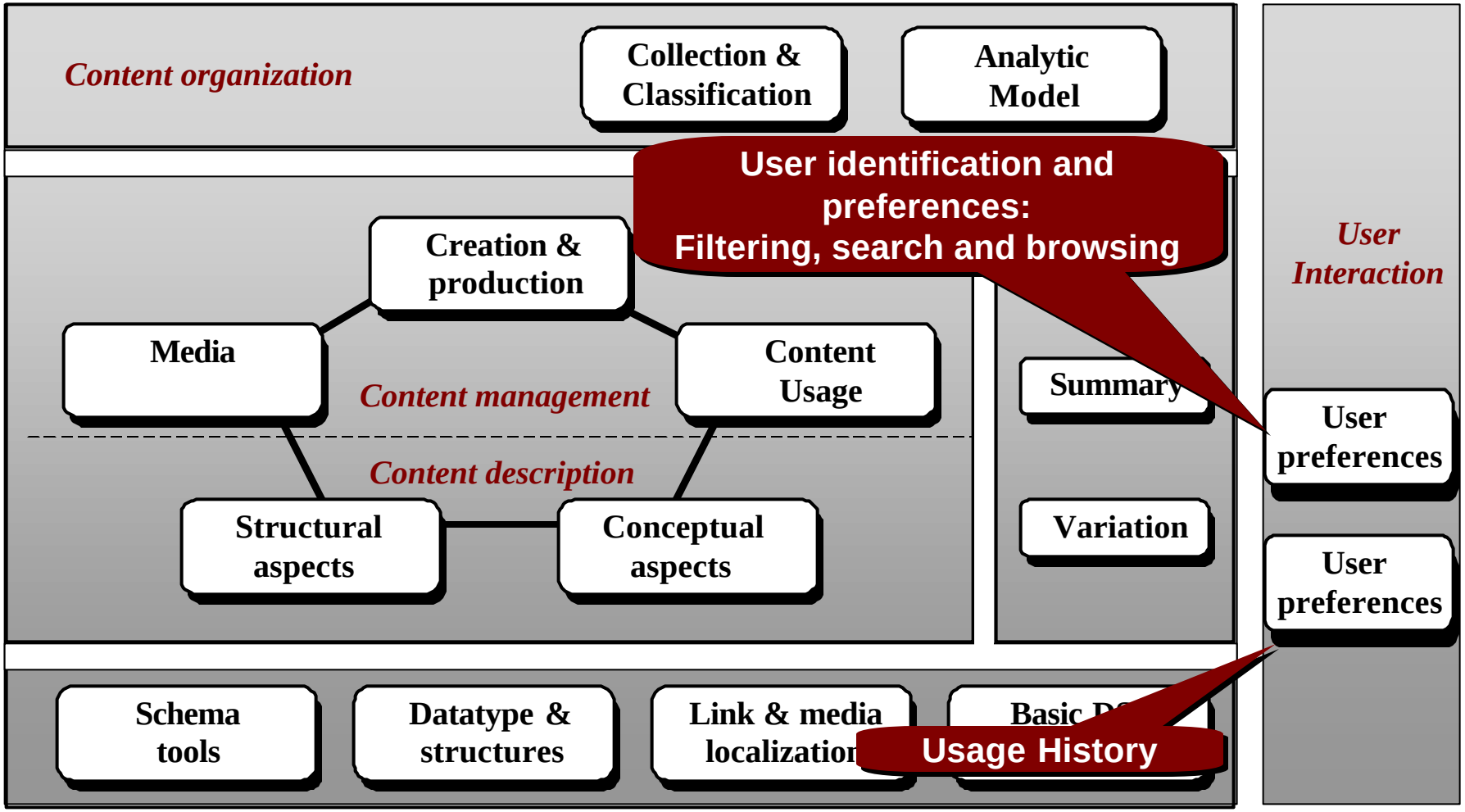
Collection

Tools for:

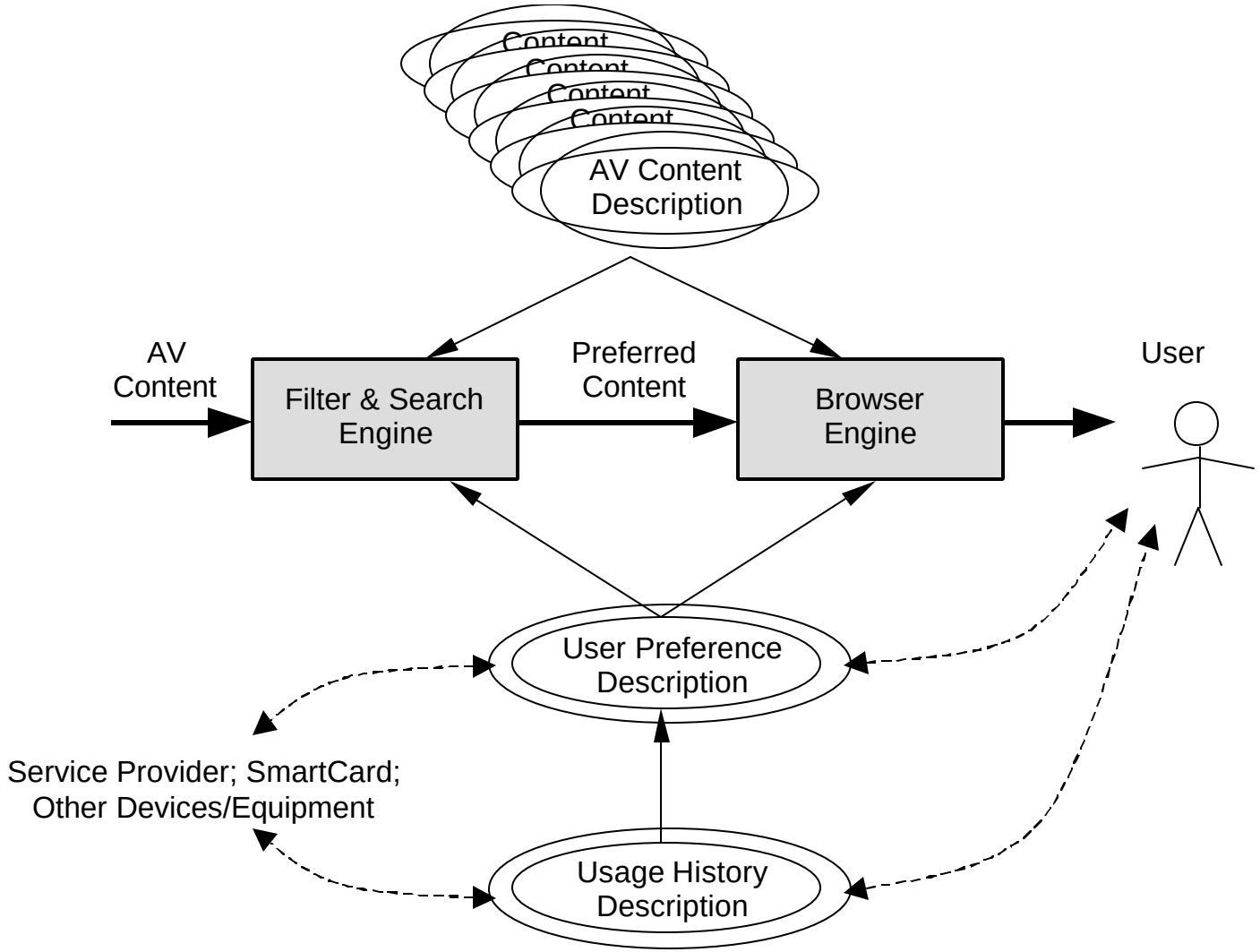
- **Collection of AV content**
- **Collection of descriptors instances**
- **Collection of Concepts**
- **Mixed Collections**
- **Structure of the collection**



User Interaction



User interaction



Use of description tools

- Library of tools!
- The description tools have been presented on the basis of the functionality they provide.
- In practice, they are combined into meaningful sets of description units.
- Furthermore, each application will have to select its relevant sub-set of descriptors and DSs.
- DDL can be used to handle specific needs of the application.

Relation with other standards

- AHG on “Metadata integration” :
  - SMPTE: Metada dictionary
  - Dublin Core Metadata Initiative
  - European Broadcast Union
  - NewsML
- AHG on TV AnyTime Application
- Large number of Liaisons:
  - SMPTE
  - Dublin Core
  - W3C (XML Schema)
  - etc.

Conclusions

Multimedia Description Schemes:

- Model of the description
- Library of description tools

- Covers a wide range of generic needs (together with audio and visual)
  - Single AV document as well as collections
  - Various viewpoints about the content: structural, conceptual, management, etc.
  - Support of various functionalities: search & retrieval, browsing, organization, selection, etc